REMARKS

The Office Action mailed January 18, 2006, has been received and reviewed. Claims 1 through 53 are currently pending in the application. Claims 1 through 53 stand rejected. Applicants have amended claims 1, 19, 23 and 41 and respectfully request reconsideration of the application as amended herein.

Notice of References Cited

Applicants note that a Form PTO-892, Notice of References Cited, was provided by the Office with the outstanding Office Action which contains an error. The Document Number, date and name for relied-upon reference U.S. Patent No. 4,465,091 to Keller appears to have been incorrectly listed as 4,465,901 to Best. For the convenience of the Examiner, Applicants have listed the U.S. Patent No. 4,465,091 in the accompanying Information Disclosure Statement and request that the information cited on the accompanying form PTO/SB/08A be made of record herein and that a an initialed copy of form PTO/SB/08A be returned to Applicants' undersigned attorney.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 4,465,091 to Keller in view of U.S. Patent No. 4,114,469 to Stratienko

Claims 1 through 20, 31 through 43, and 49 through 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Keller (U.S. Patent No. 4,465,091) in view of Stratienko (U.S. Patent No. 4,114,469). Applicants respectfully traverse this rejection, as hereinafter set forth.

> M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:
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> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of the claims are improper because the

references relied upon by the Examiner fail to teach or suggest all of the limitations of the presently claimed invention and because there is a lack of motivation to combine the references in the manner proposed by the Examiner.

Claims 1 through 18

Claim 1 is directed to a fluid flow control device. As amended herein, the fluid flow device of claim comprises: a valve having a fluid inlet, a fluid outlet and a flow path defined therebetween, the valve further including a valve seat in communication with the flow path and a valve stem disposed within a valve seat and cooperatively configured with the valve seat to cause the valve stem to advance or back off within the valve seat responsive to rotation of the valve stem about a first axis; a gear member coupled to the valve stem; and a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, *wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis*. Applicants respectfully submit that the proposed combination of Keller and Stratienko fails to render claim 1 obvious.

The Examiner cites Keller as disclosing "a valve having a fluid inlet (12) and a fluid outlet (13) with a flow path defined therebetween, a valve seat (14), a valve stem (17) threadedly engaged with the valve, with the valve stem cooperating with the valve seat by advancing or backing-off therefrom responsive to rotation of the valve stem to which is coupled a gear member (29) which in turn is coupled to an electrical motor (32) that is configured to be operated by remote control." (Office Action, page 2). Noting that Keller fails to disclose a linear position member engaging a gear member, the Examiner cites Stratienko as disclosing "a linear positioning member in the form of a worm gear [(42)] that is coupled to the gear of the valve shaft for the purpose of obtaining efficient power transmission from the motor to the valve shaft." (Office Action, page 3). The Examiner concludes that it "would have been obvious to one [of] ordinary skill in the art at the time the invention was made to have provided in Keller a linear positioning member that is coupled to the gear of the valve shaft for the purpose of obtaining efficient power transmission from the motor to the valve shaft, as recognized by Stratienko." (*Id*). Applicants respectfully disagree.

Keller discloses a valve that may be used in caustic environments and which is self-

cleaning through a grinding operation that may take place when the valve is in a closed position. The valve includes valve stem (17) carrying a disc (16) configured to engage and disengage a valve seat (14). A stem nut (22) is coupled to the valve stem and is configured to be rotated by a drive motor (26) and associated gearing. Rotation of the stem nut (22) results in longitudinal displacement of the valve stem without any rotation of the valve stem.

A second drive motor (32) is coupled to the valve stem by way of gearing such that actuation of the second drive motor results in rotation of the valve stem relative to the stem nut as well as a longitudinal displacement of the valve stem. It is possible to actuate both drive motors such that the one drive motor tries to displace the valve stem in a first longitudinal direction while the second motor rotates the valve stem and tries to displace the valve stem in a second, opposite longitudinal direction. Thus, the valve stem may be rotated relative to the valve body while the two drive motors effectively cancel each other out with respect to any longitudinal displacement of the valve stem. This allows the disc to be rotated relative to the valve seat so as to perform a grinding or cleaning action of the mating surfaces. (*See*, e.g., col. 2, line 4 – col. 3, line 26). As noted by the Examiner, Keller clearly fails to teach or suggest a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis.

Stratienko discloses a valve having both an automatic motorized actuator (12) and a manual actuator (13). Clutch mechanisms are used to engage and disengage the valve stem (and associated gearing) from the actuators such that only one of the actuators is engaged at a given time. The drive mechanism includes a worm gear (42) coupled to a shaft (40) which is ultimately driven by one of the actuators (i.e., the motor (12) or the hand wheel assembly (13)). Rotation of the shaft/worm gear results in rotation of the driven worm gear sleeve (44) which is attached to the stem (45). When the stem reaches its limit (i.e., a fully opened or closed condition), the worm gear, due to its continued rotation and the stem's resistance to further rotation, becomes displaced along the axis of the shaft (40) until an assembly associated therewith trips a limit switch causing the motor to disengage. Such displacement of the worm gear <u>does not result in further rotation of the stem</u> but, rather, prevents unwanted torque from developing in the stem when the stem reaches an open or closed position. (See, e.g., col. 2, line

28- col. 3, line 32; col. 5 lines 5-56). Thus, Stratienko clearly fails to teach or suggest a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, wherein the linear positioning member is configured to be displaced along a second axis *and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis*.

Moreover, Applicant submits that there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner. The Examiner merely concludes that it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have provided the Keller device with a linear positioning member that is coupled to the gear of the valve shaft. However, even assuming, *arguendo*, that the worm gear of Stratienko could be considered a linear positioning device as set forth in claim 1, the Examiner hasn't indicated which component of the Keller device would otherwise be replaced with such a worm gear or how the Keller device would be modified to accommodate such a worm gear.

Additionally, the Keller device is configured to provide certain specific functions which include the possibility of driving both motors such that the "opening and closing action [of the valve stem] may take place at twice the speed of a conventional Lunkenheimer valve operated manually in one of its two modes." (Keller, col. 2, lines 60-65). Stratienko, on the other hand, expressly acknowledges that the use of a worm gear enables the device to receive high rotational motion of a drive motor and *reduce* it to the *low speed* linear or rotational motion of a valve stem. (*See*, e.g., Abstract). Thus, one of ordinary skill in the art would recognize that combination of the worm gear with Stratienko with the device of Keller (assuming such could be accomplished) would render the Keller device inadequate for at least one of its intended purposes.

Applicants, therefore, submit that claim 1 is clearly allowable over the proposed combination of Keller and Stratienko. Applicants further submit that claims 2 through 18 are also allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claims 2 through 14, Applicants again submit that neither Keller nor Stratienko teach or suggest a worm gear being configured as a *linear positioning member* as recited in claim 1.

With respect to claim 4 through 13, Applicants submit that neither Keller nor Stratienko teach or suggest a linear positioning actuator coupled with the linear positioning member and configured to displace the linear positioning member along the second axis so as to and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis.

With respect to claims 5 through 9, while the Examiner states that the drive motors of Keller are taken to "include all known kinds" of electric motors, Applicants submit that Keller has made no suggestion that such motors include stepper motors, nor has the Examiner set forth a logical line of reasoning as to why Keller's very general disclosure of electric and hydraulic motors would be taken to include stepper motors. As such, Applicants submit that Keller and Stratienko fail to teach or suggest the presently claimed invention including, for example: a linear positioning stepper motor configured as set forth in claim 5 of the presently claimed invention; a stepper motor coupled with a controller as set forth in claim 6; or a stepper motor configured to receive an electrical input signal in the range of approximately 4 to 20 milliamps as set forth in claim 7.

With respect to claim 14, Applicants submit that Keller and Stratienko clearly fail to teach or suggest a worm gear that is substantially rotationally fixed about the second axis. Rather, Stratienko teaches the exact opposite in discussing the rotation of the worm gear (42) for driving the worm gear sleeve (44) and its associated stem (45).

With respect to claim 15, Applicants fail to find any teaching or suggestion in Keller or Stratienko that such valves are configured to accommodate a fluid flow at a pressure of up to at least approximately 3,000 pounds per square inch.

With respect to claim 16, while the Examiner asserts that "the combination of Keller and Stratienko is configured to have the recited values of the flow coefficient," Applicants fail to find any teaching or suggestion in Keller or Stratienko (nor has the Examiner pointed to any specific teachings) that such valves are configured to have a flow coefficient of approximately 0.004 C_v.

With respect to claim 17, Applicants fail to find any teaching or suggestion in Keller or Stratienko (nor has the Examiner pointed to any specific teachings) of a valve configured to maintain a substantially constant flow rate of fluid flowing therethrough at *approximately 1 milliliter per minute or less.*

Applicants, therefore, respectfully request reconsideration and allowance of claims 1 through 18.

Claims 19, 20 and 31 through 40

Claim 19 is directed to a fluid flow control system. As amended herein, the system of claim 19 comprises a controller and at least one fluid flow control device operably coupled with the controller. The at least one fluid flow control device comprises: a valve having a fluid inlet, a fluid outlet and a flow path defined therebetween, the valve further including a valve seat in communication with the flow path and a valve stem disposed within a valve seat and cooperatively configured with the valve seat to cause the valve stem to advance or back off within the valve seat responsive to rotation of the valve stem about a first axis; a gear member coupled to the valve stem; and a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, *wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis*. Applicants respectfully submit that claim 19 is not rendered obvious by the proposed combination of Keller and Stratienko.

The Examiner relies on Keller and Stratienko as applied to claim 1 as has been discussed hereinabove. The teachings of Keller and Stratienko have also been discussed hereinabove.

It is clear that the proposed combination of Keller and Stratienko fails to teach or suggest a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, *wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis*.

Moreover, as discussed hereinabove, there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner.

Applicants, therefore, submit that claim 19 is clearly allowable over Keller and Stratienko. Applicants further submit that claims 20 and 31 through 40 are also allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 20, Applicants again submit that neither Keller nor Stratienko teach

or suggest a worm gear being configured as a linear positioning member as recited in claim 19.

With respect to claim 31, while the Examiner states that the drive motors of Keller are taken to "include all known kinds" of electric motors, Applicants submit that Keller has made no suggestion that such motors include linear positioning stepper motors, nor has the Examiner set forth a logical line of reasoning as to why Keller's very general disclosure of electric and hydraulic motors would be taken to include linear positioning stepper motors.

With respect to claim 36, Applicants fail to find any teaching or suggestion in Keller or Stratienko that such valves are configured to accommodate a fluid flow at a pressure of up to at least approximately 3,000 pounds per square inch.

With respect to claim 37, while the Examiner asserts that "the combination of Keller and Stratienko is configured to have the recited values of the flow coefficient," Applicants fail to find any teaching or suggestion in Keller or Stratienko (nor has the Examiner pointed to any specific teachings) that such valves are configured to have a flow coefficient of approximately 0.004 C_V.

With respect to claim 38, Applicants fail to find any teaching or suggestion in Keller or Stratienko (nor has the Examiner pointed to any specific teachings) of a valve configured to maintain a substantially constant flow rate of fluid flowing therethrough at *approximately 1 milliliter per minute or less.*

With respect to claim 39, Applicants submit that Keller and Stratienko clearly fail to teach or suggest a worm gear that is substantially rotationally fixed about the second axis. Rather, Stratienko teaches the exact opposite in discussing the rotation of the worm gear (42) for driving the worm gear sleeve (44) and its associated stem (45).

Applicants, therefore, respectfully request reconsideration and allowance of claims 19, 20 and 31 through 40.

Claims 41 through 43 and 49 through 53

Independent claim 41 is directed to a method of controlling the flow of a fluid. The method comprises: providing a valve having an inlet, and outlet, a flow path defined between the inlet and the outlet, and a valve seat in communication with the flow path; disposing a valve stem within the valve; coupling the valve stem with a gear member; engaging the gear member with a complementary surface of a linear positioning member; flowing the fluid through the flow path; and *displacing the linear positioning member along a first axis to rotate the gear member and*

valve stem about a second axis and displacing the valve stem along the second axis. Applicants submit that the proposed combination of Keller and Stratienko fail to render claim 41 obvious.

The Examiner relies on Keller and Stratienko as applied to claim 1, as discussed hereinabove, and states that "the combination of Keller and Stratienko necessarily performs the method recited in claims 41 – 43 and 49 – 53 in its usual and normal operation." (Office Action, page 4). The teachings of Keller and Stratienko are discussed hereinabove.

It is clear that Keller and Stratienko fail to teach or suggest displacing the linear positioning member along a first axis *to rotate the gear member and valve stem about a second axis* and displacing the valve stem along the second axis. Additionally, as discussed hereinabove, there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner.

As such, Applicants submit that claim 41 is clearly allowable over the proposed combination of Keller and Stratienko. Applicants further submit that claims 42 through 43 and 49 through 53 are also allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 42, Applicants submit that neither Keller nor Stratienko teach or suggest forming the complementary surface *of the linear positioning member* as a substantially helically cut worm gear.

With respect to claim 43, Applicants submit that Keller and Stratienko fail to teach or suggest substantially restraining the worm gear from rotating about the first axis. Rather, as discussed hereinabove, Stratienko teaches the exact opposite.

With respect to claim 50, Applicants submit that Keller and Stratienko fail to teach or suggest that flowing the fluid through the flow path includes effecting a phase change within the fluid. While the Examiner asserts that "the combination of Keller and Stratienko is capable of [handling] any fluid including, compressible, incompressible and that undergoing a phase change" (Office Action, page 3), Applicants fail to find any specific teaching in Keller or Stratienko regarding such valves effecting a phase change as a fluid flows therethrough.

With respect to claim 51, Applicants submit that Keller and Stratienko fail to teach or suggest flowing the fluid through the flow path further includes flowing the fluid at a *substantially constant rate of approximately 1 milliliter per minute or less*.

With respect to claim 52, Applicants submit that Keller and Stratienko fail to teach or suggest maintaining a pressure of the fluid within approximately 3 pounds per square inch of a predetermined pressure.

Applicants, therefore, respectfully request reconsideration and allowance of claims 41 through 43 and 49 through 53.

Obviousness Rejection Based on U.S. Patent No. 4,465,091 to Keller and U.S. Patent No. 4,114,469 to Stratienko as applied to claims 1-20, 31-43 and 49-53 above, and further in view of JP 07012689

Claims 21 through 27, and 44 through 48 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Keller (U.S. Patent No. 4,465,091) and Stratienko (U.S. Patent No. 4,114,469) as applied to claims 1-20, 31-43 and 49-53 above, and further in view of JP 07012689. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 21 through 27

Each of claims 21 through 27 depend, ultimately, from independent claim 1. The Examiner relies on Keller and Stratienko as applied to claim 1 and cites JP 07012689 as employing the use of a PID controller "and/or sensors operably connected to the controller." (Office Action, page 4). The Examiner then concludes that it "would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided in the combination of Keller and Stratienko a controlled that comprises a P.I.D. controller and/or sensors operably connected to the controller for the purpose of automatically controlling the flow based on desired sensed parameter values." (*Id*). Applicants respectfully disagree.

As set forth hereinabove, Keller and Stratienko fail to teach or suggest all of the limitations of claim 1. For example, Keller and Stratienko fail to teach or suggest a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, *wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis.* Additionally, as discussed hereinabove, there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner.

Applicants submit that JP 07012689 fails to cure the deficiencies of Keller and Stratienko. Applicants, therefore, submit that claims 21 through 27 are allowable at least by virtue of their dependency from an allowable base claim.

Moreover, Applicants note that, while JP 07012689 discusses a control board (60) and a controller (70), it does not appear to disclose a PID controller as set forth in the presently claimed invention.

Applicants, therefore, request reconsideration and allowance of claims 21 through 27.

Claims 44 through 48

Each of claims 44 through 48 depend, ultimately, from independent claim 41. The Examiner relies on Keller and Stratienko as applied to claim 1 and cites JP 07012689 as employing the use of a PID controller "and/or sensors operably connected to the controller." (Office Action, page 4). The Examiner then concludes that it "would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided in the combination of Keller and Stratienko a controlled that comprises a P.I.D. controller and/or sensors operably connected to the controller for the purpose of automatically controlling the flow based on desired sensed parameter values." (*Id*). Applicants respectfully disagree.

As set forth hereinabove, Keller and Stratienko fail to teach or suggest all of the limitations of claim 41. For example, Keller and Stratienko fail to teach or suggest *displacing the linear positioning member along a first axis to rotate the gear member and valve stem about a second axis and displacing the valve stem along the second axis*. Additionally, as discussed hereinabove, there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner.

Applicants submit that JP 07012689 fails to cure the deficiencies of Keller and Stratienko. Applicants, therefore, submit that claims 21 through 27 are allowable at least by virtue of their dependency from an allowable base claim.

Moreover, Applicants note that, while JP 07012689 discusses a control board (60) and a controller (70), it does not appear to disclose a PID controller as set forth in the presently claimed invention.

Applicants, therefore, request reconsideration and allowance of claims 21 through 27.

Obviousness Rejection Based on U.S. Patent No. 4,465,091 to Keller and U.S. Patent No. 4,114,469 to Stratienko as applied to claims 1-20, 31-43 and 49-53 above, and further in view of U.S. Patent No. 6,712,085 to Weissgerber et al.

Claims 28 through 30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Keller (U.S. Patent No. 4,465,091) and Stratienko (U.S. Patent No. 4,114,469) as applied to claims 1-20, 31-43 and 49-53 above, and further in view of Weissgerber (U.S. Patent No. 6,712,085). Applicants respectfully traverse this rejection, as hereinafter set forth.

Each of claim 28 through 30 depend, ultimately, from independent claim 19. The Examiner relies on Keller and Stratienko as applied to claim 19, and then cites Weissgerber as disclosing "a fluid flow system wherein a pump is operably connected to a controller that controls the pump for providing a desired fluid through the system." (Office Action, page 5). The Examiner concludes that it would have been obvious to one [of] ordinary skill in the art at the time the invention was made to have provided in the combination of Keller and Stratienko a pump that is configured to provide a supply of flow through the valve, for the purpose of providing a controlled fluid flow therethrough." (*Id*). Applicants respectfully disagree.

As set forth hereinabove, Keller and Stratienko fail to teach or suggest all of the limitations of independent claim 19. For example, Keller and Stratienko fail to teach or suggest a linear positioning member having at least a portion thereof configured to complementarily engage the gear member, *wherein the linear positioning member is configured to be displaced along a second axis and cause rotation of the gear member and the valve stem about the first axis upon such displacement of the linear positioning member along the second axis.* Additionally, as discussed hereinabove, there is a lack of motivation to combine Keller and Stratienko in the manner proposed by the Examiner.

Applicants submit that Weissgerber fails to cure the deficiencies of Keller and Stratienko. As such, Applicants submit that claims 28 through 30 are allowable at least by virtue of their dependency from an allowable base claim. Applicants respectfully request reconsideration and allowance of claims 28 through 30.

ENTRY OF AMENDMENTS

The amendments to claims 1, 19, 23 and 41 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1 through 53 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,

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